

FIG. 1

# The Genomic Structure of the Mouse *Csx/Nkx2-5*

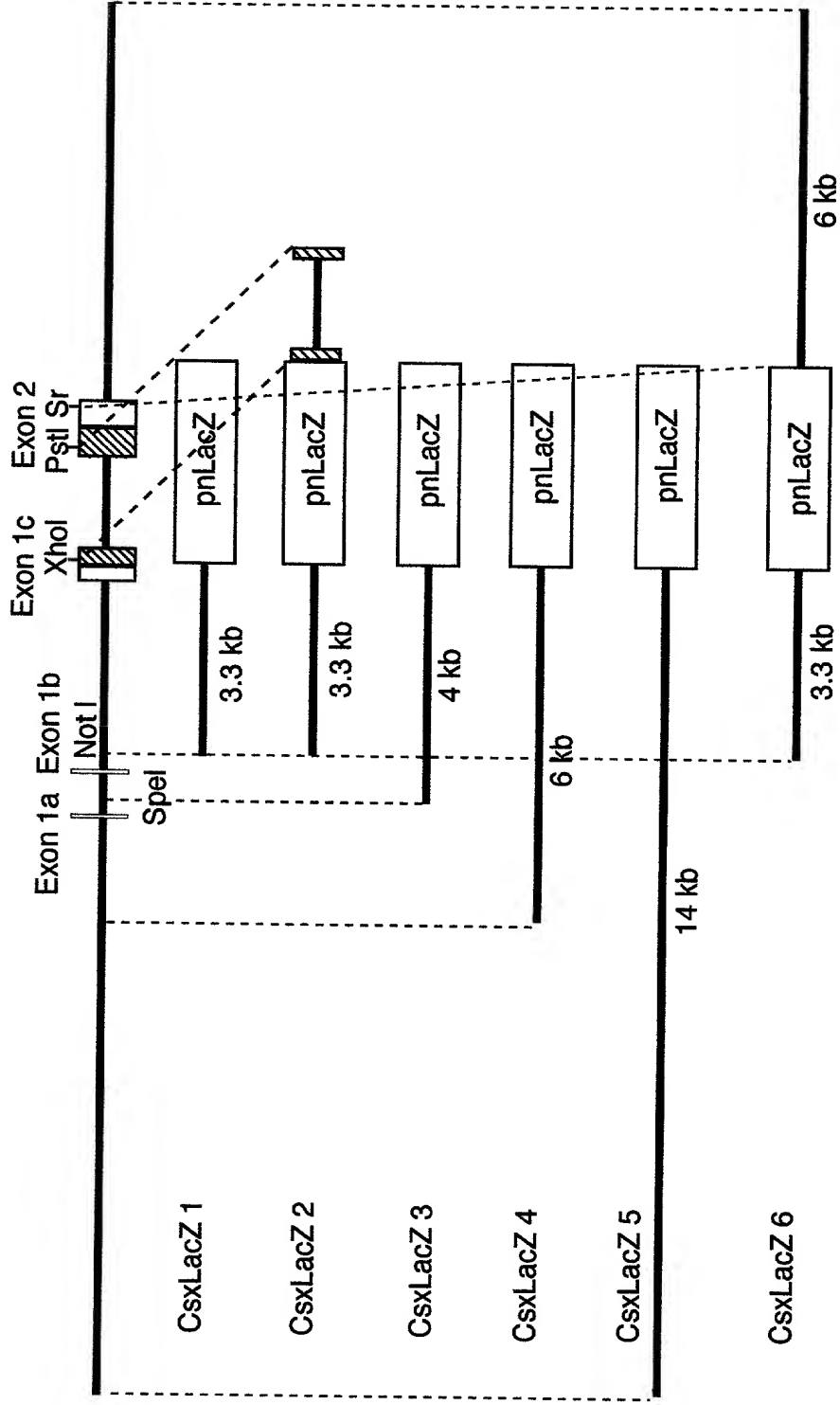
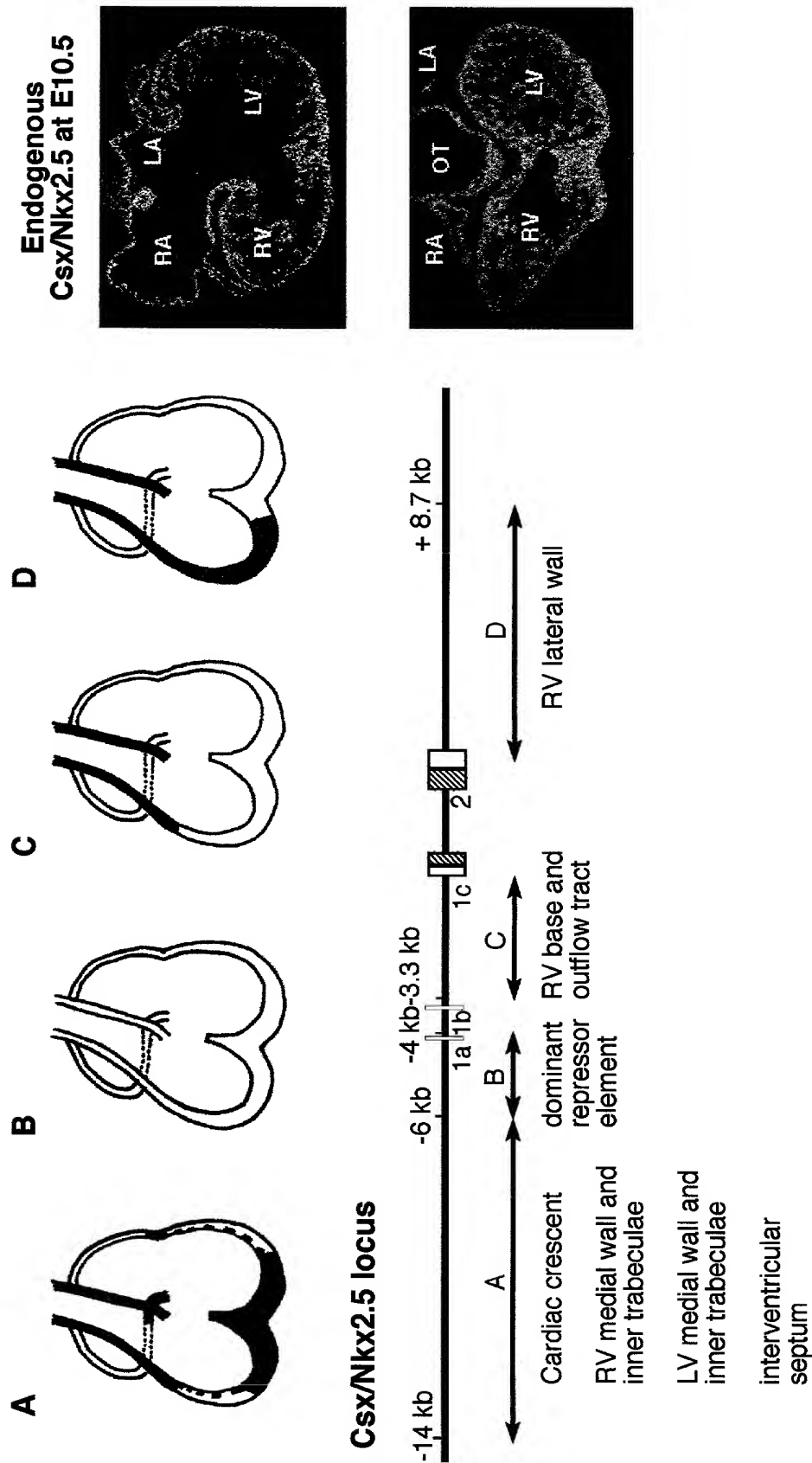


FIG. 2

# The Locations of the *Csx/Nkx2-5* Cardiac Enhancers



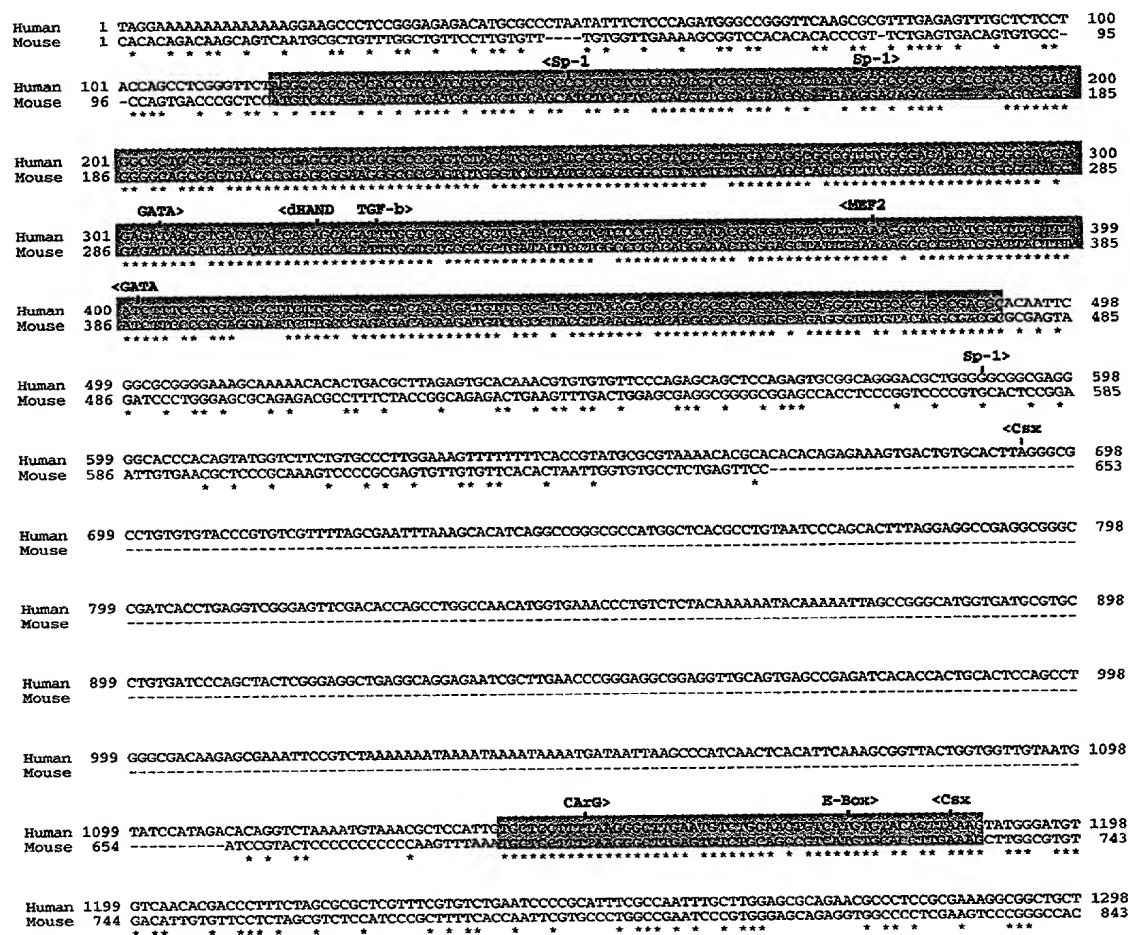
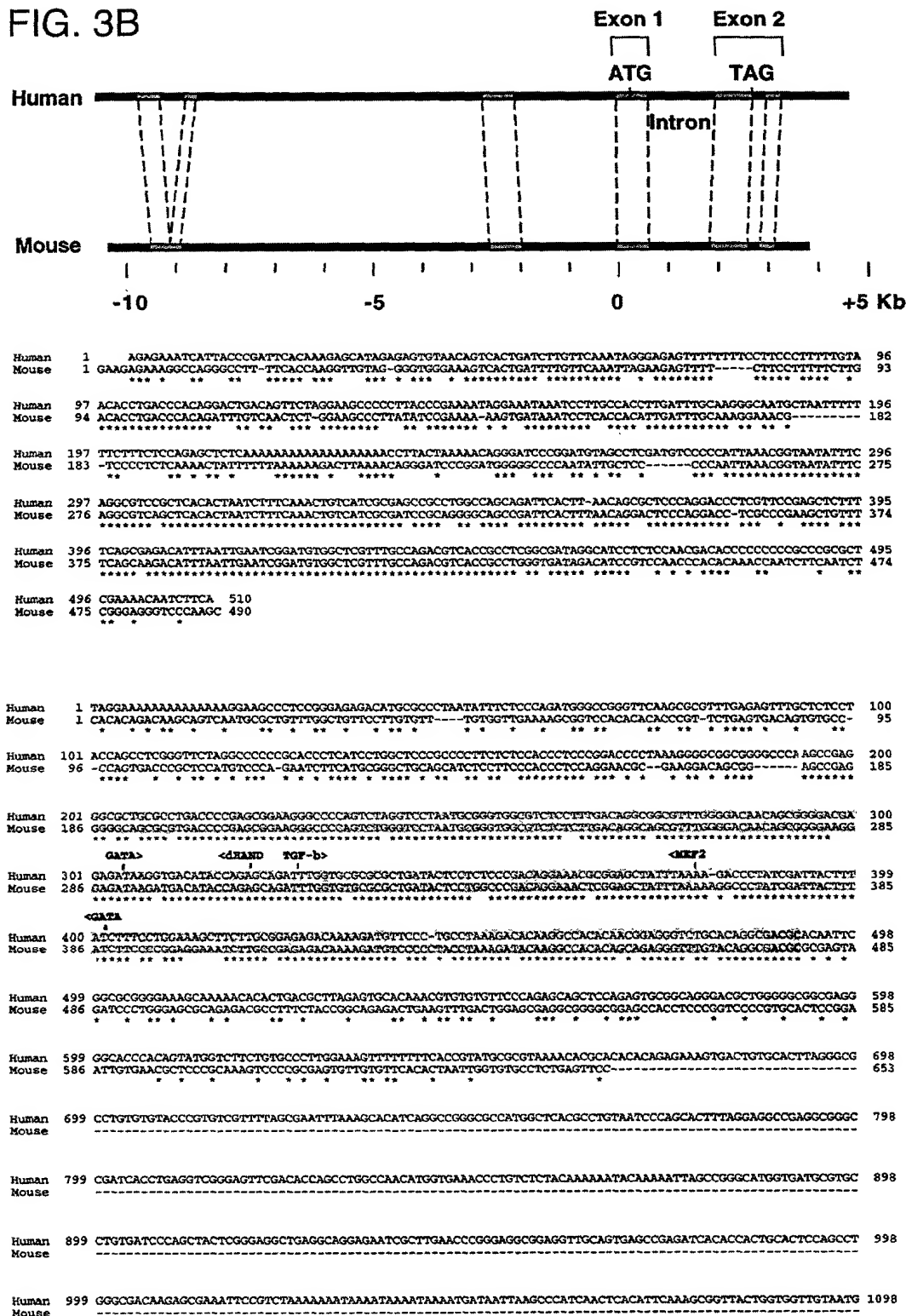
[illegible]

FIG. 3B



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FIG. 3C

**The Genomic DNA Sequence Homology  
Between Human and Mouse Csx/Nkx2-5**

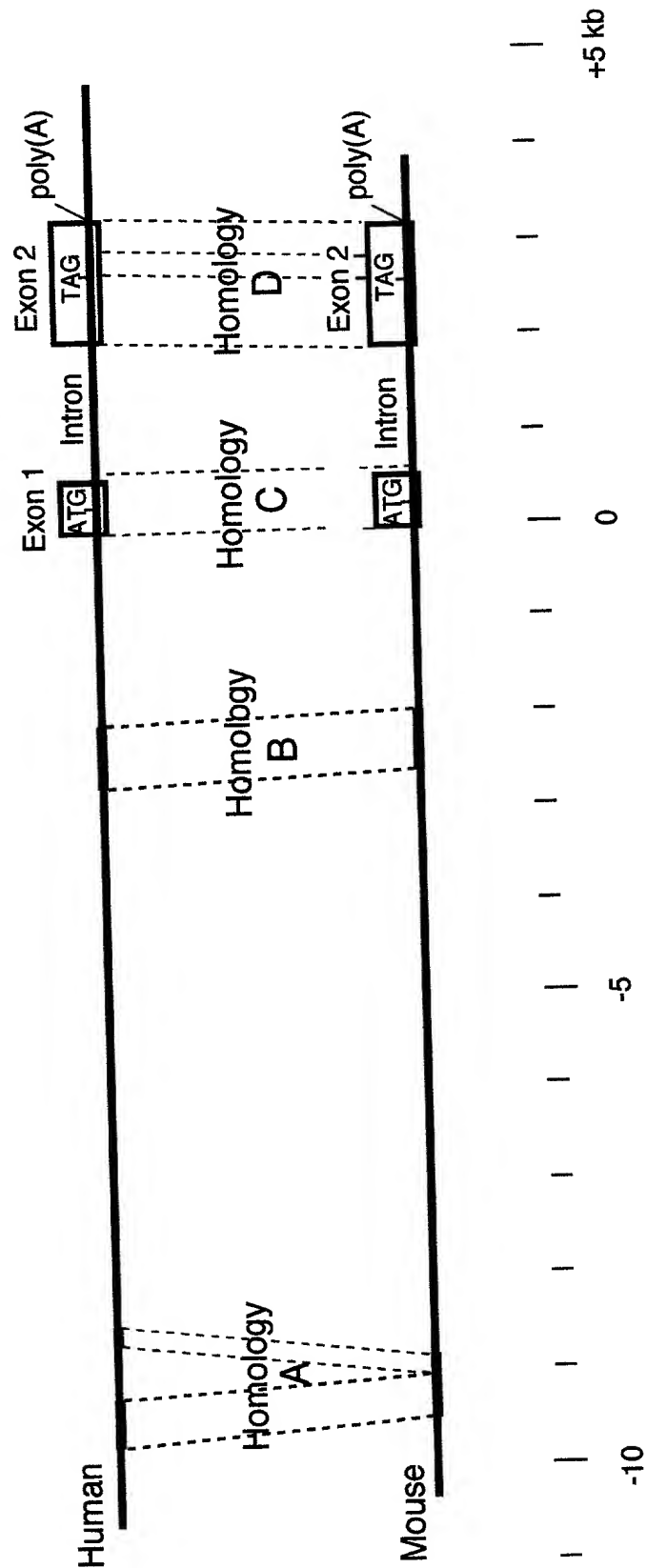


FIG. 4A (1)

CTCGAGCCCAGGAGTTCAAGACCAGCCTGGGAAACATAGGGAGACCCC  
 TCTCTCTCCACAAAAAATTTAAAAACTAGCCAGGTGTGGTGGCAAACA  
 CCTGTAGTCCCAGCTACTCAGAAGGCTGAGGTGGGAGGATCACTTGAG  
 CCTGGAAAGTAGAGGCTACAGTGAGCCGTGATCACACCACTGCACTCC  
 AGCCTGGGAGACAGAGTGAGACCCTGTCAAATAAATAAACAAACAAAT  
 AATGATTAAAAATACTAAACTAATTTTATGCTATTTTCACCTTGTAT  
 TTTGTAAAGATTTTAAATGAAAATTCCCAAATTGCTTTCCAGAAGG  
 ATTGTTCAAATTTATACCCACATTTCACTCATGTTCTCTTCTGAAACA  
 GCAGCAATCAGGAAAACTCCCTGGAAGAGGCAGGGCTTAGACTGAGA  
 TTTTAAAAGGGGGTAGGCCTCAGCTCTCCTTCCAGGTTTACACTGTGC  
 ATGTTTCCAACTCAAAGAATTTACACTCTTCTGGTTGCATTGCTCTG  
 TAAAGATCTGACCCACTACTATGTATTAAAAAGGGATGCATGATAATG  
 AATTGAGCCCTCTCTGTAAATCCAAAGGGTCCTATTGCAGTTTCCCC  
 CATTTAATGGGTCATTAAAAATATTCTTGGGAAGGACAAAGCTTTAGTT  
 AACTATGAGAAAAACAAGCAGAACCAGCCCTGGATTCTGTCTTCAAAG  
 ATTTTACCATGTTGGCAGGCCTGGTAGTCCAGAGCCCAAGAAAATATC  
 CCAGCCACAGATACCCTAGATGTAGACTAGCAGTGCTACAACCTCAAG  
 GTCAGAAGTATGTCACTAGACCAGAGCCAAAAATAGGTGCTATATCAT  
 TAAGAGAGTAAAAATGCAAACCACAGACAGGGTGACATTATTACAAT  
 AAGCATATAACCCACAGGGGACTCCTATCTGAATATGCAAAGAACTCT  
 CACTAATCAATAAGAAAAAGGCAAAAGATTTAAACAGGCACCTTCACAA  
 AAAAAGTATATTCAAAAAATCAATAAACATTTGAAAAGATCCTCAATT  
 CACTAGTTATTAGGGAAAGGTGAAATAAAACCACAATGAGACACCCCC  
 ACGCCCCCACCAGAACGGCTTAAATCTAAAACATGTAATACCGAATG  
 TTTGCAAGGATGCGGAGAACTGCCATTTTGTACACTGCCAGTATGA  
 GGGTAAATCTGTACAACCAGGTTGGAAAACGCTGAGTAGAATGTACTC  
 TAGCTGGATTTGTGAATATCATATGATCCAGCAATTCTACTCCTAGAA  
 ATTTACCCAACAGAAATGTGTAAACATGTTCAACAAAAGACACACGCA  
 AGACAATTATAGAGGGCACTCACTATTCCTAACAGTCAAAAAGTGGAA  
 ACTACCCAAATGTCCATCAGCAGAGAATGGCGATAAACAGTAGCATCT  
 TCACATAATGAAATGTTTCGACAGCAATGAAAAGTAGCTAGCTACAAC  
 TACAAACAATGTGATTGAACCTCACAAACATATACTAAGTAAAATTAT  
 CAGACACAAAGAGTGTATATACTGTATTTAGATACATGTGAAGTCTGA  
 AAACAGGCAAACTATTCTGTTGTTAGAAGTCAGAATAGTTACTGCCC  
 TGCCGGGAAACAGAACTCAAGAGGGCTTAGTAGCTACTGGTAATGTTT  
 TGCTTCCTGAACTGCATGCTAGTGAGGCAGCTGTTATTTTGTGCAGTC  
 CTGTGTTACACTGGAGTTAAAAGTTCCCCCAAATCAGAAAGTGTTCA  
 GCAAGTGGAAGCAAGTACACTGCTGGACTTGGCTGGGAACTTAGGGGA  
 TCCCATAATTTGTACAGGCACAAGCAAAGCCAGCTTTCTTGCCNTAA  
 GTAGCATCTCCAGAGTCAGGATCCAGGAATGGTTTGGCAGGCAGGAT  
 GCAAGGCAGGATTCGGGAGTGGCTGAGAGTTTCCCAGTGCCACCTGG  
 TCCCACCTCCCCTCTCCCACTTCTAATGAACGGGCAGTACAGCTTCTG  
 TTAGGAAAAGAGCCTGGGTCCCTAGGCGATGACTGTCACATCTAGGGA  
 GAGGGCGATGCACTGGGGTCCCTACCTACACCCCCCTTGGCTGTCTCA  
 CCACTCTGAATTATAAATGCCCGGACTTCCTCATCTCCCACCCACACA

FIG. 4A (2)

TCTTGTTAGAAAGAAAAGAAACGAATCTCCCAGGGCTCCTTCTAACAAA  
 AGTGTTTCATTTCAGAGTAGCCCTGCTTGAGGGCCCCCTGGCCTGGAGGAG  
 TGGGAGAGGGCAGCCCTCCCCCTCCAGGAGAGTCATCTCCAGGGCTACC  
 CAGGACTGAGTAACTAGGTCACCAGAGTAACCAAAGAGGCAGGAGACA  
 AGGGCATTCAAGCATTGGGCCAGGAATGGAGGGTGATGTCCAGTTTCAT  
 GTTCTTCTGGTTCCAGCATAGCACACGGTGCAAATGAACCATCATGCA  
 AGAAAACACAGCTAGTCTCCCTTCCCTCCACCAGCAACCTTTGGTTACT  
 GATAATAATCAAATTCATAATTTTTTTTTTTTTTTTAACTAAGGCTGAG  
 ATAATGTCAAAGGACCACAGGGAATAGGAAGGCCCTAAACCAAGGCCTT  
 AAAGAATGAGAAGAAGATTCAATTCAAAAAGCCTCCTAAGGGAGGAAG  
 ATGTTTTTCCCTCCTTTACTTTTCTACAGTAATTTTTATTTTGGATAA  
 ATAAACCCTGATAAATGAGAACCCACGCTTTCCCAAGGCCAGGCTGTG  
 TTTTGGTGGGTGGTCCCTCCGTGAGCAGTTGGAGTAATCCAGAGTGATC  
 CCGGGCAAGTCGGAAGGGAGCAAGTCTGTGTTGAAGCCAAGAGGTATC  
 TTTCCCTACAGCTTCTCAAGAGAGGGGATCCCCGTGGGTAATTGTGAG  
 GCTGGAAACACCGAGAGGCTGACTCCCATGTTTATAGAGGTCATTGAT  
 GGGTTTGTGCATGGAAGGCAGGAGGAGACTGAGAGTGCTTTGTTATTG  
 TTATTTGGTTTATTTTTTATTTTTTAAAAAACTGGATCAGCCGACTTTGA  
 ATACAGAAAATGAAAATGAGGAGATTTGCATAACAGCGCTTGGACGT  
 CTGAAGGGGGCCAGGGCCTAGCGGCTGGTGGGGCACCTAGAAACACTT  
 CTGCCTGCAGATCGCGGAGGGTTAGCCACAGGAAGGGGTGCGCTAGGC  
 TGGCCACAGGGCCTTTGCTGTGACTGAAGGACCAGCCTTGGCGGCACC  
 TTCTTTCCCCCTCTGCCCTGCACTCCGGCCCCGCGGAGTCAGAGCTGA  
 CTTGCTGCAGGTTGGGGAGAGGACAGAGGCTAGGACGGTGGCGAAACC  
 TCACCTCGTCGCAGTCCGGAAGGTAAACTTGGACCCGGCAGGCACCTC  
 CTAAAGTCCAAGCTGCCCTCTCTGAAGAATAAACCTGATTTTCCTCCG  
 GACGCGGACAAAGGAGGATTGCTCACAACCTAGCCTGTAACAAAGATT  
 CCCTATTTTCGTGGTTAGGAAAAAAGGAAGCCCTCCGGGA  
 GAGACATGCGCCCTAATATTTCTCCAGATGGGCCGGGTTCAAGCGCG  
 TTTGAGAGTTTGCTCTCCTACCAGCCTCGGGTTCTAGGCCCCCGCAC  
 CCTCATCCTGGCTCCCGCCCCCTTCTCTCCACCCTCCCGGACCCCTAA  
 GGGGCGGCGGGGCCCAAGCCGAGGGCGCTGCGCCTGACCCCGAGCGGA  
 AGGGCCCCAGTCTAGGTCTAATGCGGGTGCGGTCTCCTTTGACAGGC  
 GCGTTTGGGGACAACAGCGGGGACGAGAGATAAGGTGACATACCAGA  
 GCAGATTTGGTGCGCGCGCTGATACTCCTCTCCCGACAGGAAACGCGG  
 AGCTATTTAAAAGACCCTATCGATTACTTTATCTTTCTTGAAAGCTT  
 CTTGCGGAGAGACAAAAGATGTTCCCTGCCTAAAGACACAAGGCCACA  
 CAACGGAGGGTCTGCACAGGCGACGCACAATTCGGCGCGGGGAAAGCA  
 AAAACACACTGACGCTTAGAGTGACAAACGTGTGTGTTCCAGAGCA  
 GCTCCAGAGTGCGGCAGGGACGCTGGGGGCGGCGAGGGGCACCCACAG  
 TATGGTCTTCTGTGCCCTTGAAAGTTTTTTTTTACCGTATGCGCGTA  
 AAACACGCACACAGAGAAAGTGACTGTGCACTTAGGGCGCCTGTGT  
 GTACCCGTGTGCTTTTAGCGAATTTAAAGCACATCAGGCCGGGCGCCA  
 TGGCTCACGCCTGTAATCCAGCACTTTAGGAGGCCGAGGCGGGCCGA  
 TCACCTGAGGTGGGAGTTGACACCAGCCTGGCCAACATGGTGAAAC

FIG. 4A (3)

CCTGTCTCTACAAAAATACAAAAATTAGCCGGGCATGGTGATGCGTG  
CCTGTGATCCCAGCTACTCGGGAGGCTGAGGCAGGAGAATCGCTTGAA  
CCCGGGAGGCGGAGGTTGCAGTGAGCCGAGATCACACCACTGCACTCC  
AGCCTGGGCGACAAGAGCGAAATTCGGTCTAAAAAAATAAAATAAAAT  
AAAATGATAATTAAGCCCATCAACTCACATTCAAAGCGGTTACTGGTG  
GTTGTAATGTATCCATAGACACAGGTCTAAAATGTAAACGCTCCATTG  
TGCTCCTTTTAAGGGCTTGAATGTCTGCAACTGTCATGTGTACACTTA  
AAGTATGGGATGTGTCAACACGACCCCTTCTAGCGCGCTCGTTTCGTG  
TCTGAATCCCCGCATTTTCGCCAATTTGCTTGGAGCGCAGAACGCCCTC  
CGCGAAAGGCGGCTGCTGATCCCGACTTTGCTCCGGTATCGCGCAGCT  
TGTTGGCCTCCGGGTCCCCCGTGCCATGCCCCGGGAGGCTCTCCACA  
GACACCGCTTGCGCCGAATTATACGAGACTGAATGGGTTTTTTTGGTG  
TGTGTGTGCAACACAACAATTTGTCAGCTGCTGTTCACAATGCGCTCC  
GCCGGGCGGTGGAACTTGGCTGCGGTAACGCACAGCAGGTTGGAGGG  
CACGACCCGGAAGGAAGGAAGAGGCGAGGAGGGAAAGGCGGCGACCCT  
AGGCCCCGCTGGCCAGCCGTTTCCAGCATCAATTCAGCACTGAGCCGGC  
CGCAGCAGCACAGGGCTGGGGGCTCCCGGAAGTTCGGCCAGCCGGGGT  
TTGGGCCAGAGCCGCGGAGGCTGCCCGGTGGTAGGTGCGACTCTTCAC  
CTCTCCGGGGAGCGGCGGCCGACGACCCAACCCACCCGCAAGCGCTGC  
CGTCCGCCCCGGCTGGTCCCCCGCGCGGGCACAAAAACAGGCGGCAGTT  
CGCCAGCTCTCTTTTCCCAAACCTGAACCGCCAAGCCGAAGGTTCTTC  
CAAAGTCGCGGTTCCCCGGGCTTCACACCCGCGGGCAGGCGCGAACC  
AGCCCCAGGACAACCATTTTCTCTTCACTGTATCTGAGTCGTTGTCC  
ATCTGACTCGAATGTCACCTGATTTTCCAGCTGTGACCTCCAGCGAC  
GGGACTCCGAGGAACTGATTCCAGCGTCTCGATTCTCTCCGCCTCTCC  
GCCCCGTTTTGGCTGAAGCGGTTTGCAGCCGTCGGGGCAGAAGGGGTGG  
GATGTGGCAGCCACCAGCCCCAGCCCAGAGAAGAAAAGAGGACGAAAT  
TAACGCGAAAGGACACCGGAAGTCTGAAAGCGACTCCCTCGGATCCTC  
GGAATCCGAGGCAAACCTAACACTAGTTTGAAAGCGGATCATATCCA  
CTAATCCAGGACAAATTCGGGTGTTGGGAAACATACTCCCCAGAGCCTAA  
GAAAACCTGACTTACAACAAAACAAAACCTGACAAGGACAAAATGCAAAG  
GAGTTTGTGAAACGTAATTGCTCTCAGAAAATATGTGTATATATATAC  
ATCCTATAATATGTTTTAAATTTGCAAAAAAAAAGTCTCTAAGAGGAT  
ATATTTTTTAAACCAAGTGGCAGCTTGGGAGGGAGTGGGGATTAGCTGA  
GAAGGGGAGAAGGAAGCATTTTTGAGGTGACGTAAATGTTTTTGTATC  
TTGATTATGGTGGCTGTTATGGGGGTGCACATCCAAGTGTCAAGACTC  
ATCGAACTGTACACTTTTGTTCTAGGTACATTAGACCTCAATAAAGTG  
GATTTTAAACCTAAATAAGCCAGGTAACAGCTTTGCCTGGGTGGCTGG  
GGGAGAGGCTTGGGACACTTTACATTGATCTCCCTCTTAGGCATGTTC  
GTTTTGGTTTGGTTTTGTTCTTATGATGTATTATTTATTCAAAAATAT  
ATCATTAGCAGAGTGAAGTGTAAATGTAAAACCATTTGTTAAGGAAA  
CCAACAAAAGCGGGAACAAGAGACACTGGTGCATCCTGTTAGAGGGAT  
AAGAATAAGCACTCGCTGTCCAAGCTCATAAAATATTTTGGGAATGAA  
TGTCGTTCCGCTTTGTTTTTTTGGTTTTTTTGCTCATGTGTTTAACAT  
CAACGAGAAATGAGGACCCAAAACCTTATCCAGTGGTTACGTGTGGTGT



## FIG. 4A (4)

GTGTGGCTGTCATCTCCTTGGGACTGGCTACTGAAGGCCACAGGCGTG  
GGAGGACCAAATGCTCCCTGGATGTTGAGTCCCAGCCGGTAAGCAGCA  
CACAGTCCCGCTTGCAGCAAAGATGTGGTGGCCGGCTGCGCTGTGGGG  
GAAGGCCAGGCCCGGACAGGAACCTCAGATCTCACC GGCGGATGAGAG  
TGGTGGCCCCCTGCAGCTGGAGTCCCTGCTGGCCTGAGAGCTCCAGCTG  
TGCCACCGTTGGGCAGACCCCACTTCAGGGAGCTGCCAGGATCAGT  
GGCTACAAGAGTCCCCACCGTGTTTGGAGAACTAGGTATGAAATATT  
TCCATTTACACCCCTACCCGGCCCCAGACAGGAAAGTCACTTCAACC  
TTGTTAGGTCAGATTCCAGATCTGGTTCAGATGCAGGGCTATTTTCA  
GAGATTTTTAGAGGCTGACTCTCAGGAGAGGGAAGGACAGTGGGCTGA  
AGGCCAGGGGTCAGGAAATCTAGGAACTGCTAAACTCCTCTGCTGGCC  
TGCGGGGAGCGCCCCGGGTGGGGCTACCAAGGCCACAAGCCAGTTCCAT  
CTTCCCACTTTGCCACCTTCTCACAGGGACCAGGCTCTGCATCCTCAG  
TGACCACAAGACTTGGGCCTGCCCTCTAGTTTGTCTATACCTGCCCCC  
TCCCTTGACTCATACTGTCCAAGACCCCAAGACCAAACCACAAGTCAG  
GAGAGATCTTGAGGGCAGCCAGTGCCACCAGGGTCTGTTCACAGGTA  
CTACTAGACAAAGGCCACCCCTTCCTCCCCTCTCTCTAGGGCTCCGCTG  
ACCACCCTGCACAGTCTTCCCTACACCAAGGGCTCCGGTGCCACCCCTT  
CACAGAGAGTTCACTGCACCGCTGCTTCGGCTGCCTGTCTCAAACCAT  
ACACACACCTTTGATTCTTAAACTCCAAGATTAGGATGGGCCCCAGAA  
ATCTGCATTTTTAATATGTACCTCAGAGGATTCTGGCCTAGATATTTT  
TACAGCCCCAAAAGTAACAAGGAACCTGTTCCAAAAAGTGTATTACGG  
AAACTGTCATGTTTATTCTTGACTTGCCCCCAATTATTCTTCCCCTG  
AAGTTTTCATCACCAAAAAACCCACATGTGAACCATATGTGTACATA  
TGCCCATATTTAAAATACAAATTCTGCACCTGGTTTGCTATTTAAAGT  
ATCTCAAAACATATCCATAAGAATACATATGAATGGAACATAATTCTTT  
CTCATGGGATATGGGATCTGTTCTATGGACAACATAATTTTAAACCAG  
TCCTAGTATATATACACTGGTTTTTTTACATGTTGATCTTAAAAAATAA  
AAACGGNTGAAA (SEQ ID NO.: 4)

FIG. 4B (1)

CAATTTCTATTNAGTTCTATTAAAAGGGATTTTTTTTNAACTCACTGGNAACCAGGAGGA  
CTGNAAAGAAAAGTGAAATGGCTCTGGGACTTTCTCTAAGGAGACCAGCATGGGTCGCC  
CCAATTTTTATTTTGCACGTATTTGTCCGTTTTTGCCCCATCTCCTCTCTCCTGAAACAC  
CAAGACCTTTTTGGAAGCCAAGAGAAATCATTACCCGATTACAAAAGAGCATAGAGAGTG  
TAACAGTCACTGATCTTGTTCAAATAGGGAGAGTTTTTTTTTCTTCCCTTTTTTGTAACAC  
CTGACCCACAGGACTGACAGTTCTAGGAAGCCCCCTTACCCGAAAATAGGAAATAAATCC  
TTGCCACCTTGATTTGCAAGGGCAATGCTAATTTTTTTTCTTCTCCAGAGCTCTCAAAAA  
AAAAAAAAAAAAACCTTACTAAAAACAGGGATCCCGGATGTAGCCTCGATGTCCCCCAT  
TAAACGGTAATATTTTCAAGCGTCCGCTCACACTAATCTTTCAAACGTGTCATCGCGAGCCG  
CCTGGCCAGCAGATTCACTTAACAGCGCTCCAGGACCCTCGTTCCGAGCTCTTTTCAGC  
GAGACATTTAATTGAATCGGATGTGGCTCGTTTGCCAGACGTCACCGCCTCGGCGATAGG  
CATCCTCTCCAACGACACCCCCCCCCCGCCCGCGCTCGAAAACAATCTTCAAAGGCAAGG  
GGGCCCCCAAGTAGGTTAATTTACAACCATAACGGTAACGTGGCCAAAAGNCAGGCGAG  
GAAGGGCCGCAAGGCCGCTGACATGCAAGCTCCGTCCAAGAAGAATTTGGGTGGAGGTG  
AAGAGGTGGGGGGACGAGTTTCNTGGGCCTTGAACGCCCCACATTTAAAAAAGGCATCC  
TCCACAGACTAGACTAACAATTCAGACCCCCAGTAGTCCCTGGCTCAGAACTCGAGGC  
GTGATTTGCGCGTGGCAGCCAGGCCTGTTACTGACGGCTGGCGCCTAGAAGCCGGGGTC  
AGGGCGTTGCGCGCCTCCTGGGCTGCCCTGCGGGGCTCACCTCTCTCCCAGCATGGAGG  
CCCCAGGTCCTGGGAGTGTGGCTTTGATGAGGGACAGGAAAAGTCCCAACATCAGGCCAA  
TGCTTGACTTCACTTGCGTGGCGCTCTCAGACGGCACACTGTGCGGGTTTGAGCACCCAAG  
ATGTACGTTCTGGACAGACACTATTTTGTCCCCATACATGGAGCGTTTCTCCGCACCTT  
GGGCGCGCCTGCGGGAGCTGTGTCTTTAGGTAGTTTTTGGCCCTGCGCCGCCTTTATTCT  
ACTCCAAGCGCTCTTTGCCAAACCCGCACTCCGCAAAGAGCCAAGCCCTCCACATCCCCA  
TTCTCAGCAAGTCCACGCGTCCCGCCCAGCTTCCCGCCCGCGGTTCCCTGTACCAGCTAG  
GGCCGTGAGAAGCCAACGCTTTTCCACTGACAAATCCTGTCATCCCAGCTCTAGAAGGC  
GTCCTTAACCTGGGCCCCGCTCTGCCTGCCCGGACTCCTGAATTGTAAGCAAATAAACT  
CCTCTCTGCAGTGTTCTGGGGAATGGAGAAGACCCCAAGCTTTCATCAGACCCTCCCAAG  
GAGTGCGGGGACCCAGAGAAATGAGGCCACCCGGGCAGGATCTGGCCATGTAGCTGGCGC  
TCCTGAAACTCTGGCAGATTTGTCTGACTTCTGTGCCCTACTCTACTGACCCTGGGCTAA  
AAATGATCATGATCACCCCACTTGCCCTGCCCTTCCCCACGCGCCTGACCGAGCCGCAG  
GGGTGCCCCACTGGAAGTCCGGCCCAGAGGCCTCAGAGAAATCCTGGCCTAGCTGGGCTC  
AGAGGAGCCCCGCCTCCCTGAGAGCTAAACCTGGGCTAGGACCCTGAAACCTCGAGGTTG  
GCAGAAGCCTGAGGGCCTTGCTGCCAGGCAGGGAGGGCACGGAAGGAGGGAGGTGGGAT  
CGATGGCCTCCAAACAGGGGAAACAAGGTGGCTGGTAGCTGGGGCACTCCACAAGACAGG  
TGTNTCCTGGGAAGCTGAGCTTACCAGCTGGGATTCTGATTTATTTATTATTAAGGGG  
AGAGGCATTTCCCCTGGGAGGGTACTGGCAGTGACTGATGCCCCCTGGAGTTGTGCTGTG  
CATAACACTACTGTAGGAGGCAGCAACTCCTACCCACCTGGCCATCACTCACCTTGCCC  
TTACTTTCGTTGATTCGCCCAGAAGCACCCAGAGCCTGCGGCATGATTGACCCTGTAGGC  
CAAGCCAAACCAACCCCCGAATTGTCCAGAAATTTTCGCCCTGGTGTATCCCCAAAGCCC  
AGCCCTGTCTTTNAGGGTTTTTTTTTCTATTGAGATTTTCCCTCATCCCACCACCTTTAGT  
AATAAAGCCTTCTCAAATAATTTCTTCCCACCGCTTCCCACCCCATCTTTTTTTTTT  
CCCATGCTGGTTTGGGTGCTGAGGAATATTTTTTCAAACCCACACCCATCCAGCCCTGCC  
CAGAGGCCTGACTTTGCATGCCTCTGGTAGGNTTTTCAGGGTTACATTAGGGAGCAAAAG  
CAGGGTGACGGGGCAAAGGGGACCTTCCAAATGGGTGCGTGGCCCCCTTTAAAAAAGCTG  
GGCAGGGNTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTGCCGTATGACTATA

FIG. 4B (2)

TTAGGTGACACGAAACTGCTCATCGCTCCTGTCATCGAGGCCCCCTGGCCCAATGGCAGGC  
TGAGTCCCCCTCCTCTGGCCTGGTCCCGCCTCTCCTGCCCCCTGTGCTCAGCGCTACCTG  
CTGCCCCGACACATCCAGAGCTGGCCGACGGGTGCGCGGGCGGGCGGCAGCCATGCAG  
GGAAGCTGCCAGGGGGCCGTGGGCAGCGCCGCTTTCTGCCGCCACCTGGCGCTGTGAGAC  
TGGCGCTGCCACCATGTTCCCCAGCCCTGCTCTCACGCCACGCCCTTCTCAGTCAAAGA  
CATCCTAAACCTGGAACAGCAGCAGCGCAGCCTGGCTGCCGCCGAGAGCTCTCTGCCCG  
CCTGGAGGCGACCCTGGCGCCCTCCTCCTGCATGCTGGCCGCCTTCAAGCCAGAGGCCCTA  
CGCTGGGCCCCGAGGCGGCTGCGCCGGGCCTCCCAGAGCTGCGCGCAGAGCTGGGCGCGC  
GCCTTACCGGCCAAGTGTGCGTCTGCCTTTCCCGCCGCCCCCGCCTTCTATCCACGTGC  
CTACAGCGACCCCCGACCCAGCCAAGGACCCTAGAGCCGAAAAGAAAGGTGAGGAGGAAAC  
ACAGGCCCCCTTCTCCCCCTCCTGGGTGCTTTTCGTCCCCAAGAAACTCAGGGCCAGGAGG  
AGGACACACGCGCCCTTGGGCGGAGGGCTGGGCTGCGGCGGGGGGTTCAGAATGTAAGAT  
GCCTGGTGTGTGCGCCAGGCTCCCGCGCCCCGCGTCCAATCGGAGGTTAGAGGAAATGC  
CGGATTGAAAGGATCCGAAAGCAAGAGACCAAAAACTTTTCCCCCGGCCTAACAAACC  
CCCGCGGTTTCCGCTCTGCTCCTGGTTCTGGTAGAATTTTAAAAATCGGTTTATGGTTA  
AACAAAAACAAAAAACAGCCAAAACCCCCGTTTTTTTACCCCCCCTTGGATTTTCAAACC  
CTTTTAAATTTTGAACAAAAACCCCCAAACAAATTAATTTTCCCCCAAAAAAT  
TTTTTTTTTTTAAACAAAAGGGGGGGTGGAAAATTTTTTTTTTCCCCCCCCCAAAGGGGTT  
TTTGTTTTTTTTTT-----TTTNTTTGGCAAAAATGAATTNTGGANCNAGGCCTTAT  
TTNAAATGGATATTGGGNCCNCAGGATTTTGATTTTCAATTTATTTTTTTAAGCAAACCTTNC  
CGGGCCGGCAAGGGGAAAGGTTCCCTCGTGGAAGTAGGAAATGCTGCGCTACCGCGGG  
CACAAGGNAGTGGACGAGATGAGTGCGGGATCATCCCGCAGGCCATCCAGGATCGGGGA  
GGGAGGCCGGCCCCGCTGCAGAAAGGGGCTTCTGGGAGACCCCCCAGCCCAAGGCAGGAG  
CCCGGGCGATTCCCGGGAGGCCGCGAGGCGTGGGCGAAGCGCTGGGCGAAGGGCCGCTGC  
CAGCCGGGAGAGAATTATAGGTTTGTGAGGAGCAGAGGCCCTGGGAACAAATTCGGGCG  
GGCACGGCGGCTAGAACTGATCGCTACCAATTGAGGAAGCCAGCAAGGCAGGTTCCGAG  
GCCGCTGCCACCCGCGAGCTTCTTGACACTGCGCAAACCTGCTGCGGCCAGGCTGGA  
GCCTCCGATCACCAAACCAACTCCCTGGCCTTCTGTTTCTTGATTCCTTAATTTTGAG  
ATAAGACCGTCCCTAGCAGTGAGGCCTCGGCCTCTGTTCATTTAACTTCTCAAACCAAAC  
TAGCCCTAATTCAGTTCACCCAGAGCATCACCTGGTTTTATTTTTTATTTTTTTATTTTT  
TTATTTATTTTTTTTTTTTTTTTGCAGCCTGAAATTTTAAGTCACCGTTTGTCTCCCTCACC  
AGGGTGTGAACTGCCCCGAGGGCAGAGACCTCCCGTTTTGTTTTTCCAGCGCCTTGAGCCA  
GCTTGACTTTTTTACAAATGCTGAGTGAGACGTGTCGGTGGCTCCCAGTGCACTTGGCAGA  
GTGAGCCGCGAGCCAGCTGGGCGCTCCAGGCAGGACACAGTGGCCTCCACGAGGATCCCTT  
ACCATTACTGTGCGGCCGCGCTCCGTAGGTCAAGCCGCTCTTACCAAGCGTCTTTCTGCC  
TTTCTGTTCCCCCTCAGAGCTGTGCGCGCTGCAGAAGGCGGTGGAGCTGGAGAAGACAGA  
GGCGGACAACGCGGAGCGGCCCGGGCGCGACGGCGGAGGAAGCCGCGCGTGTCTTCTC  
GCAGGCGCAGGTCTATGAGCTGGAGCGGCGCTTCAAGCAGCAGCGGTACCTGTGCGCCCC  
CGAACGCGACAGCTGGCCAGCGTGCTGAAACTCACGTCCACGCAGGTCAAGATCTGGTT  
CCAGAACC GGCGCTACAAGTGCAAGCGGCAGCGGCAGGACCAGACTCTGGAGCTGGTGGG  
GCTGCCCCCGCCGCCGCCGCGCTGCCCGCAGGATCGCGGTGCCAGTGCTGGTGCGCGA  
TGGCAAGCCATGCCTAGGGGACTCGGCGCCCTACGCGCCTGCCTACGGCGTGGGCCTCAA  
TCCCTACGGTTATAACGCCTACCCCGCCTATCCGGGTTACGGCGGCGCGGCCTGCAGCCC  
TGGCTACAGCTGCACTGCCGCTTACCCCGCGGGCCTTCCCCAGCGCAGCCGGCCACTGC  
CGCCGCCAACAACTTCGTGAACTTCGGCGTCGGGGACTTGAATGCGGTTTCAGAGCCC

FIG. 4B (3)

CGGGATTCCGCAGAGCAACTCGGGAGTGTCCACGCTGCATGGTATCCGAGCCTGGTAGGG  
AAGGGACCCGCGTGGCGCGACCCCTGACCGATCCCACCTCAACAGCTCCCTGACTCTCGTG  
GGGAGAAGGGGCTCCCAACATGACCCTGAGTCCCCTGGATTTTGCATTCACTCCTGCGGA  
GACCTAGGAACTTTTTCTGTCCCACGCGCGTTTGTCTTGCGCACGGGAGAGFTTGTGGC  
GGCGATTATGCAGCGTGCAATGAGTGATCCTGCAGCCTGGTGTCTTAGCTGTCCCCCAG  
GAGTGCCCTCCGAGAGTCCATGGGCACCCCCGGTTGGAAGTGGGACTGAGCTCGGGCACG  
CAGGGCCTGAGATCTGGCCGCCCATTCGCGAGCCAGGGCCGGGCGCCCGGGCCTTTGCT  
ATCTCGCCGTCGCCCCGCCACGCACCCACCCGTATTTATGTTTTTACCTATTGCTGTAAG  
AAATGACGATCCCCTTCCCATTAAGAGAGTGCCTTGACCCCGCACGTGTGCTTCTTTCA  
GCTTGCGGCGCTTCAGAAGCAGGAGAGAGGTGGCCGCCCGGGACTGGTCTCAGATCTCAG  
GCACAGGCATTCCCTGAGCAAATTGATAACATTGATACTAATAAAACCTAACCCTTGCTG  
GAACCATACTGGTTCCGTGTGCGGCACTTTCTGAGATTGTCTCATATAATCCTCAATAAT  
CCAAAAAAAAAAAAATCCTAAAGTTTAGAAGCTGAGGCCCGGAGAGGTTTAATGACTTAC  
CTGCGAGCAAATAGCCAGTACTAGTCGAACTCTGGTTAAATTCAGGATGCCTCACTTCAG  
AGACCGCCTTCCCTGTGCTCCCAAGCTCCCCTCCTTGAATCCTAATGTGTGCCAGGCACG  
GTTCCAGGCACTGGGCATTAAATGGACAAGCAAAGAACCTGGGCCCTCTGTAGCTGGAG  
AGCACCGTGATCATCCCACTTAAAGAACTCCTTAACCTGTTTCCAAGATGGNAAAAGCC  
AAGAANCCAAAGCCCTTGGGNAAGCGTTCTCAAGGGTCCTCANATGCCCCAAATGCCACG  
TCGGGGGCTCAACANCTNGCCCGTTGGAAGTGAATGCCNANGGTGGGCCCCAANAAGGN  
TCCTGCGGGATGGNGCTCAACTCCAAGCTGTGGTGAAGGCCCATAAAATTCAAATGGGCC  
AAGGGGAGCCCCCTAAAGCCCTAAACCTTCNGGGGGTCCNTTCCCTAAGGGCATTTAANT  
TTACCAAAGTTTGGNCAANAATGTTTCCAATGGNCCNGATTTTATNGANGGGNAAAAC  
TGGNNGGCAACCGAAATCCAGTTTAAACCCGGGTGTGTTT (SEQ ID NO.: 5)

# FIG. 5A

AGGCCCCCG CACCCTCATC CTGGCTCCCG CCCCTTCTCT CCACCCTCCC  
 GGACCCCTAA AGGGGCGGCG GGGCCCAAGC CGAGGGCGCT GCGCCTGACC  
 CCGAGCGGAA GGGCCCCAGT CTAGGTCCTA ATGCGGGTGG CGTCTCCTTT  
 GACAGGCGGC GTTTGGGGAC AACAGCGGGG ACGAGAGATA AGGTGACATA  
 CCAGAGCAGA TTTGGTGCGC GCGCTGATAC TCCTCTCCCG ACAGGAAACG  
 CGGAGCTATT TAAAAGACCC TATCGATTAC TTTATCTTTC CTGGAAAGCT  
 TCTTGCGGAG AGACAAAAGA TGTTCCTGCG CTAAAGACAC AAGGCCACAC  
 AACGGAGGGT CTGCACAGGC GACGC (SEQ ID NO.: 1)

TGCTCCTTT TAAGGGCTTG AATGTCTGCA ACTGTCATGT GTACACTTAA  
 AG (SEQ ID NO.: 2)

FIG. 5B

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AGGCCCCCCG CACCCTCATC CTGGCTCCCG CCCCTTCTCT CCACCCTCCC
GGACCCCTAA AGGGGCGGCG GGGCCCAAGC CGAGGGCGCT GCGCCTGACC
CCGAGCGGAA GGGCCCCAGT CTAGGTCCTA ATGCGGGTGG CGTCTCCTTT
GACAGGCGGC GTTTGGGGAC AACAGCGGGG ACGAGAGATA AGGTGACATA
CCAGAGCAGA TTTGGTGCGC GCGCTGATAC TCCTCTCCCG ACAGGAAACG
CGGAGCTATT TAAAAGACCC TATCGATTAC TTTATCTTTC CTGGAAAGCT
TCTTGCGGAG AGACAAAAGA TGTTCCCTGC CTAAAGACAC AAGGCCACAC
AACGGAGGGT CTGCACAGGC GACGCACAAT TCGGCGCGGG GAAAGCAAAA
ACACACTGAC GCTTAGAGTG CACAAACGTG TGTGTTCCCA GAGCAGCTCC
AGAGTGCGGC AGGGACGCTG GGGGCGGCGA GGGGCACCCA CAGTATGGTC
TTCTGTGCCC TTGGAAAGTT TTTTTCACC GTATGCGCGT AAAACACGCA
CACACAGAGA AAGTGACTGT GCACTTAGGG CGCCTGTGTG TACCCGTGTC
GTTTTAGCGA ATTTAAAGCA CATCAGGCCG GCGCCATGG CTCACGCTG
TAATCCCAGC ACTTTAGGAG GCCGAGGCGG GCCGATCACC TGAGGTCGGG
AGTTCGACAC CAGCCTGGCC AACATGGTGA AACCCTGTCT CTACAAAAAA
TACAAAAATT AGCCGGGCAT GGTGATGCGT GCCTGTGATC CCAGCTACTC
GGGAGGCTGA GGCAGGAGAA TCGCTTGAA CCGGGAGGCG GAGGTTGCAG
TGAGCCGAGA TCACACCACT GCACTCCAGC CTGGGCGACA AGAGCGAAAT
TCCGTCTAAA AAAATAAAAT AAAATAAAAT GATAATTAAG CCCATCAACT
CACATTCAAA GCGGTTACTG GTGGTTGTAA TGTATCCATA GACACAGGTC
TAAAATGTAA ACGCTCCATT GTGCTCCTTT TAAGGGCTTG AATGTCTGCA
ACTGTCATGT GTACACTTAA AG (SEQ ID NO.: 3)

```

FIG. 5C

AGAGAAATCA	TTACCCGATT	CACAAAGAGC	ATAGAGAGTG	TAACAGTCAC
TGATCTTGTT	CAAATAGGGA	GAGTTTTTTT	TCCTTCCCTT	TTTGTAACAC
CTGACCCACA	GGACTGACAG	TTCTAGGAAG	CCCCCTTACC	CGAAAATAGG
AAATAAATCC	TTGCCACCTT	GATTTGCAAG	GGCAATGCTA	ATTTTTTTCT
TTCTCCAGAG	CTCTCAAAA	AAAAAAAAAA	AAAACCTTAC	TAAAAACAGG
GATCCCGGAT	GTAGCCTCGA	TGTCCCCCAT	TAAACGGTAA	TATTCAGGC
GTCCGCTCAC	ACTAATCTTT	CAAACGTCA	TCGCGAGCCG	CCTGGCCAGC
AGATTCACTT	AACAGCGCTC	CCAGGACCCT	CGTTCCGAGC	TCTTTTCAGC
GAGACATTTA	ATTGAATCGG	ATGTGGCTCG	TTTGCCAGAC	GTCACCGCCT
CGGCGATAGG	CATCCTCTCC	AACGACAC	(SEQ ID NO.: 6)	





**FIG. 7**  
**Transgenic Analysis of the Human Csx Enhancer Sequence**

<u>Constructs</u>	<u># of Transgenes</u>	<u>Enhancer positives (Cardiac : Ectopic)<sup>1</sup></u>
20 kb	8	4 : 0
7.5 kb	8	6 : 1
promoter-proximal 4 kb	7	0 : 1
promoter-distal 3.5 kb	6	0 : 0
1.1 kb	8	3 : 1
1.0 kb	10	1 : 2
0.7 kb	8	0 : 3
0.3 kb	11	0 : 6
0.8 kb	6	0 : 1
0.5 kb	2	2 : 0

1. Each embryo was classified into either 'cardiac' or 'ectopic' judged upon the extent of similar to the endogenous Csx expression pattern.

FIG. 8

Cardiac Expression of the hCsx Enhancer-hsp68-lacZ Constructs

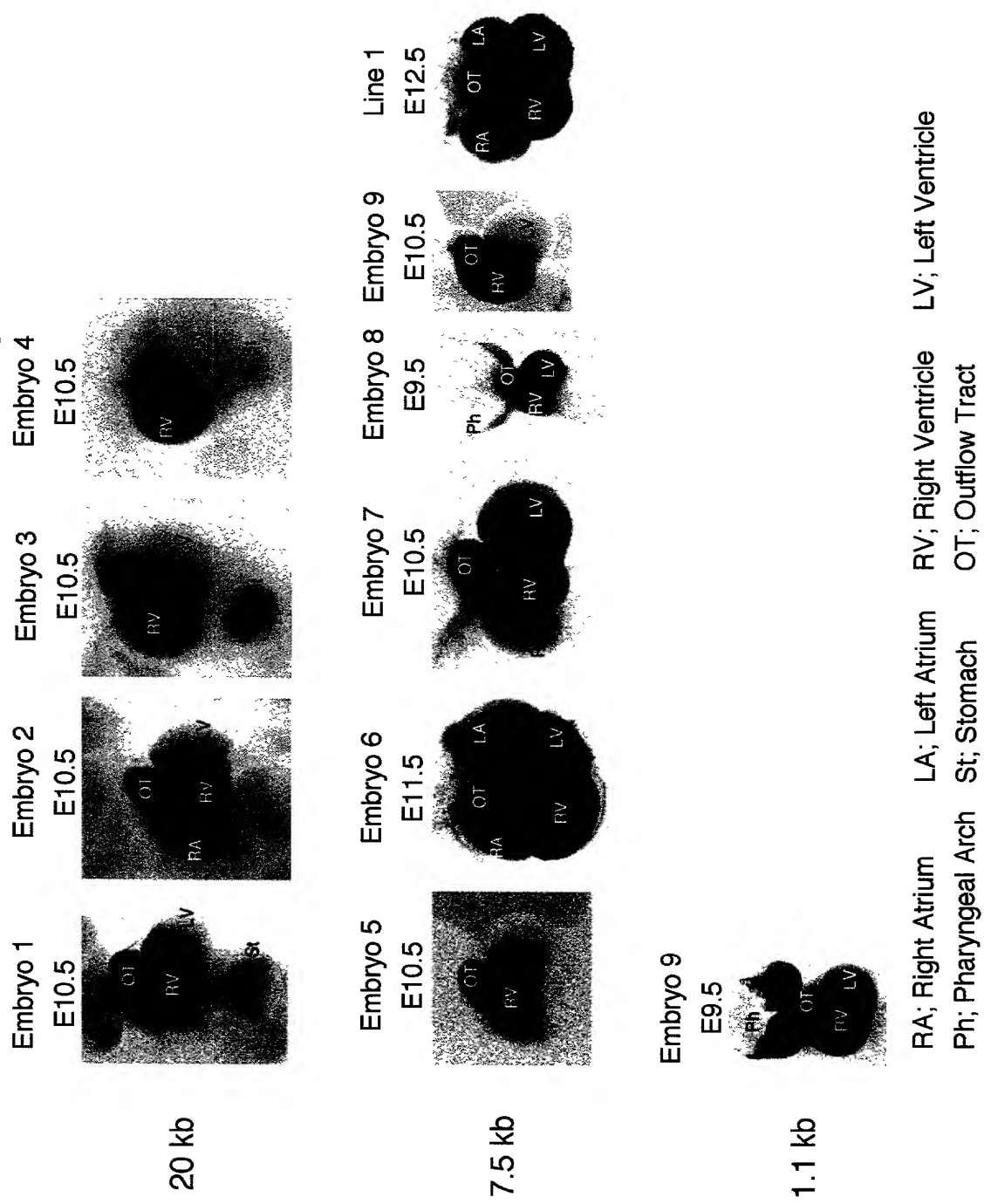


FIG. 9

# Cardiac Expression of the 7.5 kb hCsx Enhancer-hsp68-lacZ Construct

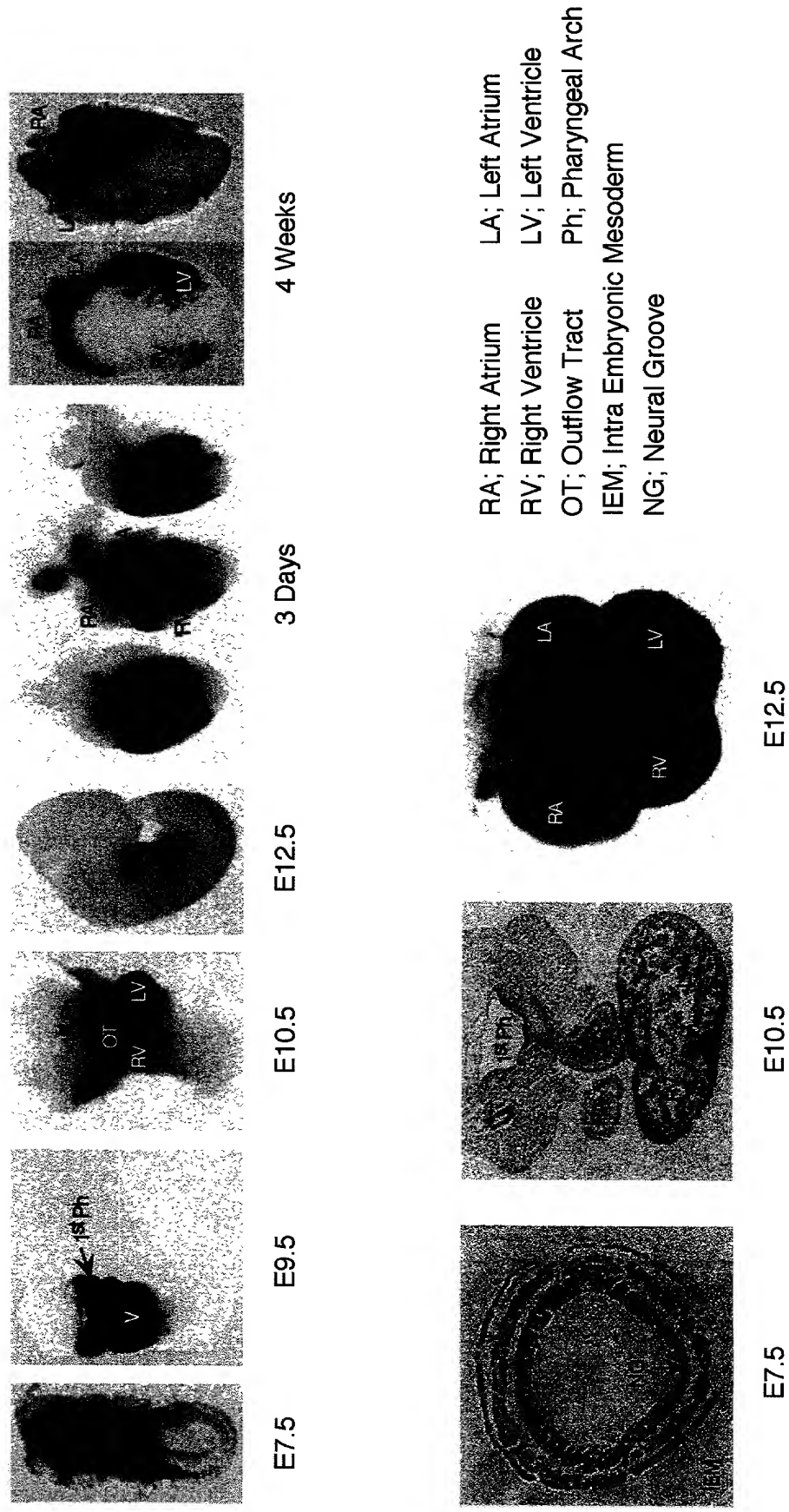


FIG. 10

# Facilitated isolation of cardiac myocytes

